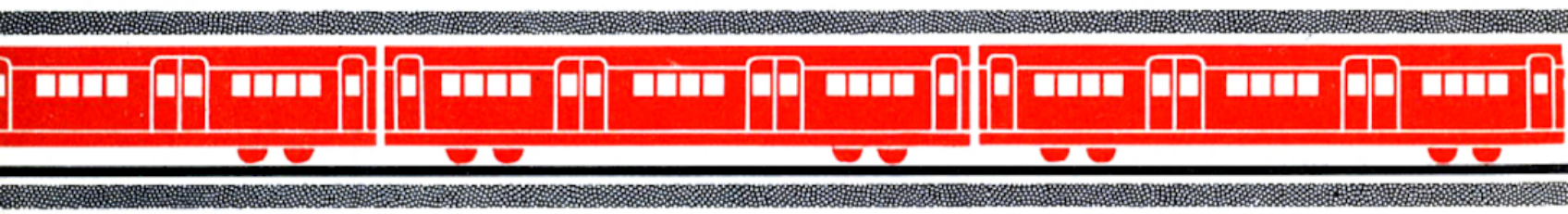
Railways under LONDON

A PARRISH COLOUR BOOK FOR OLDER CHILDREN

Railways under LONDON

by **Marie Neurath**



DISTRIBUTED BY MAX PARRISH & CO LTD LONDON

PUBLISHED BY ADPRINT LIMITED LONDON COPYRIGHT 1948
PRINTED IN GREAT BRITAIN BY JARROLD & SONS LTD NORWICH ENGLAND

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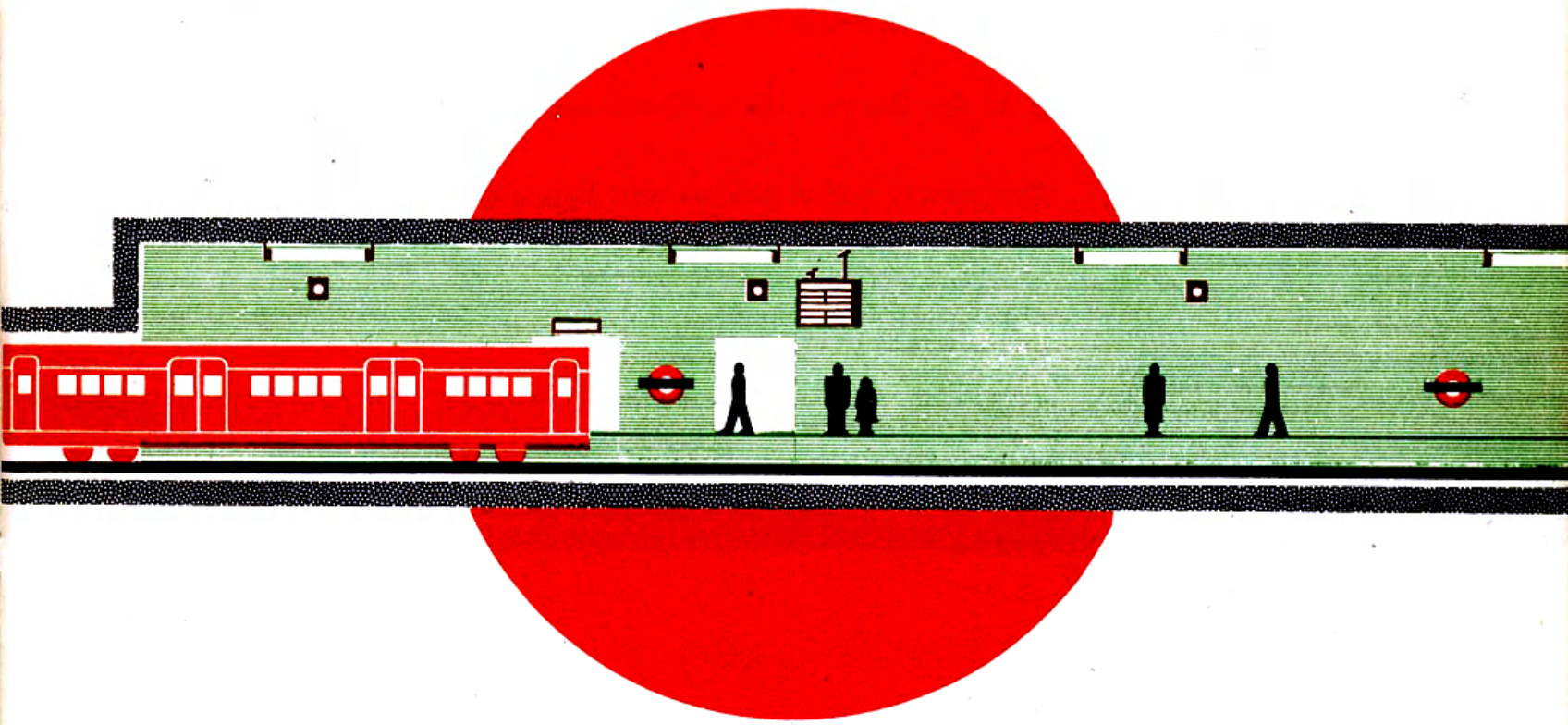

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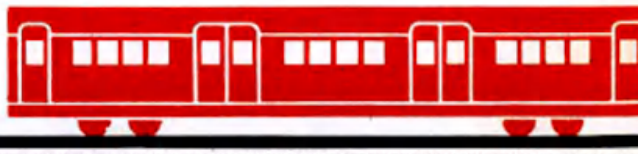

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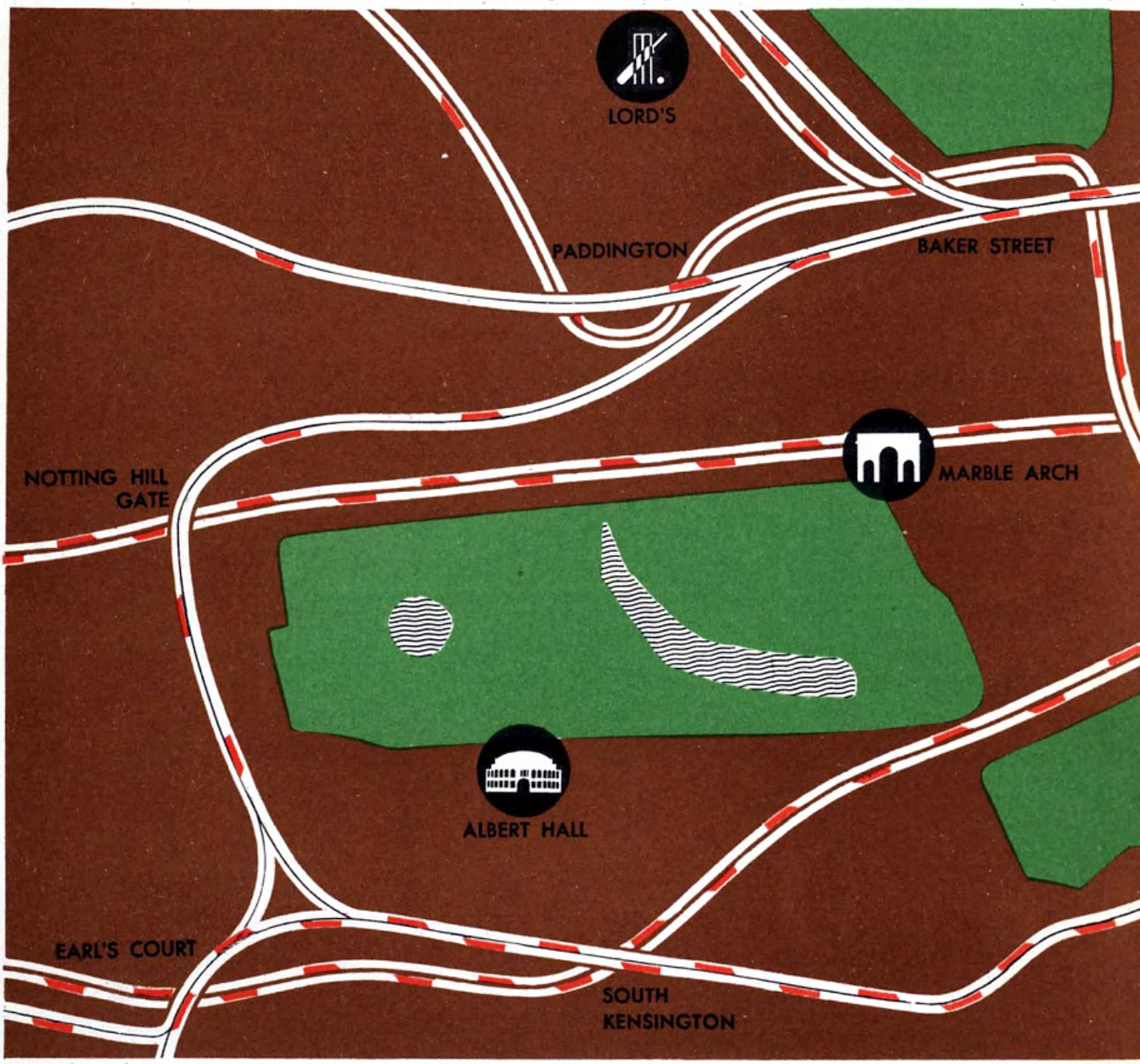
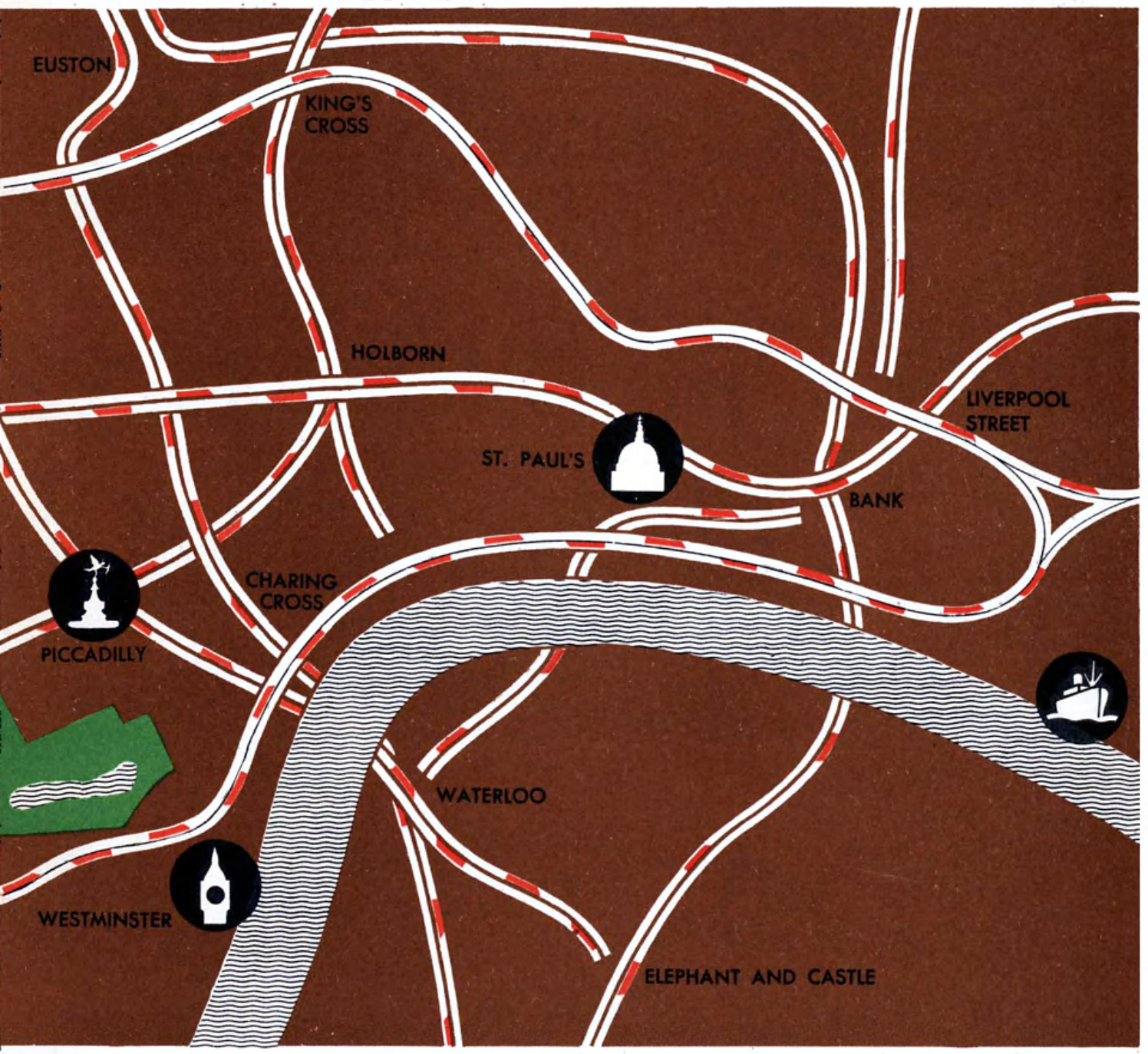
Hundreds of Trains Roar Beneath the



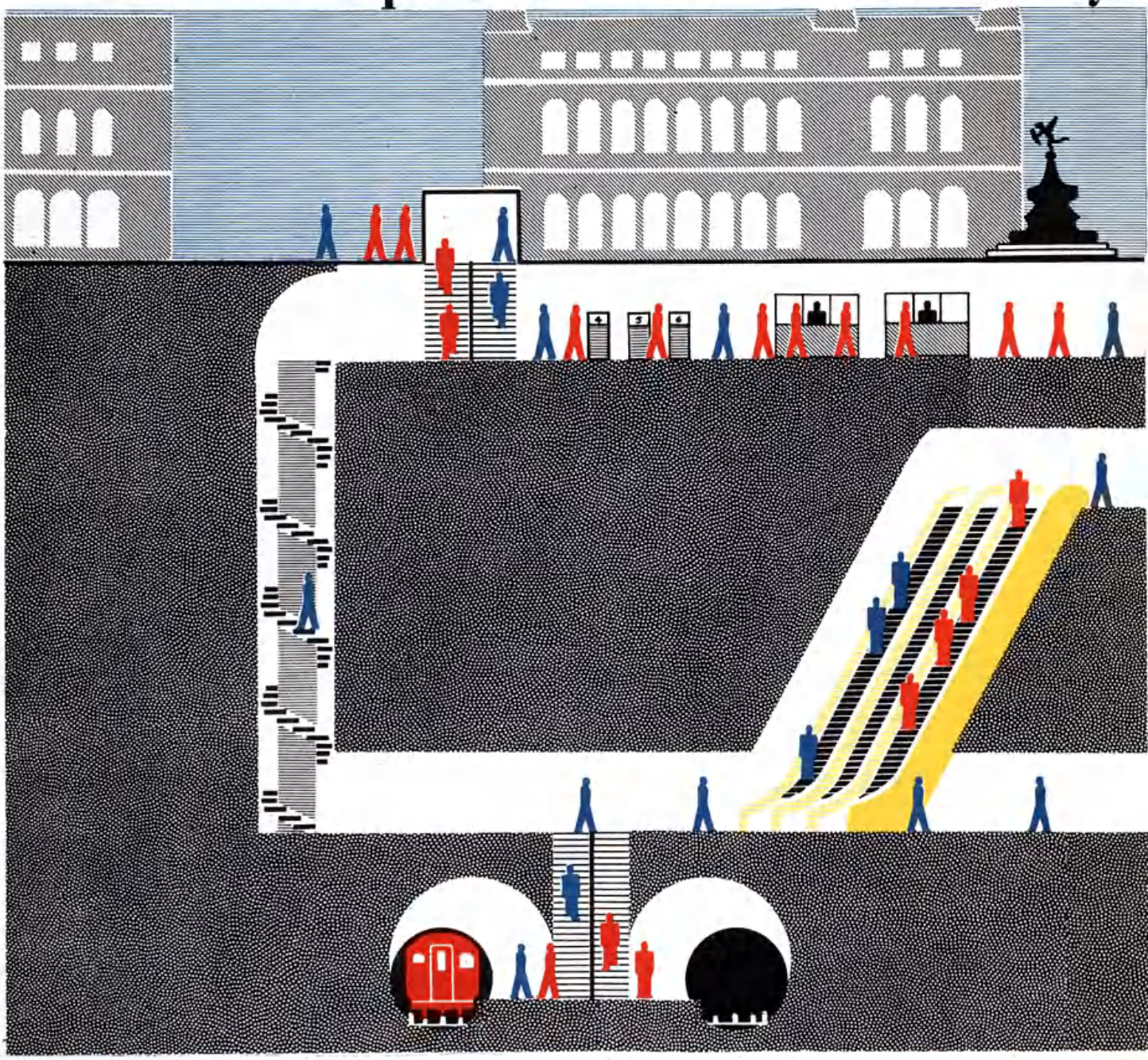
All through the day and for much of the night trains follow one another every few
aeroplane, during a rush hour, they would look like this. Every red symbol repre-

Streets of London



minutes on London's Underground. If suddenly you could see them from an sents a train; each train has six or seven coaches and carries several hundred people

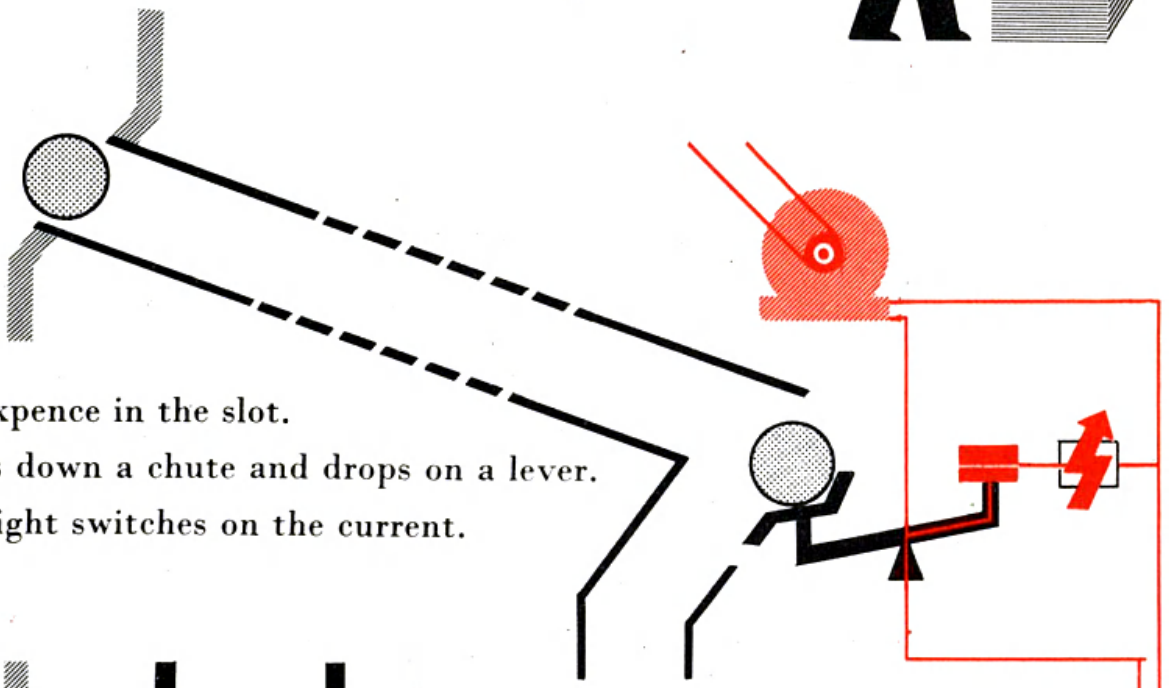
A Million People Use This Station Every



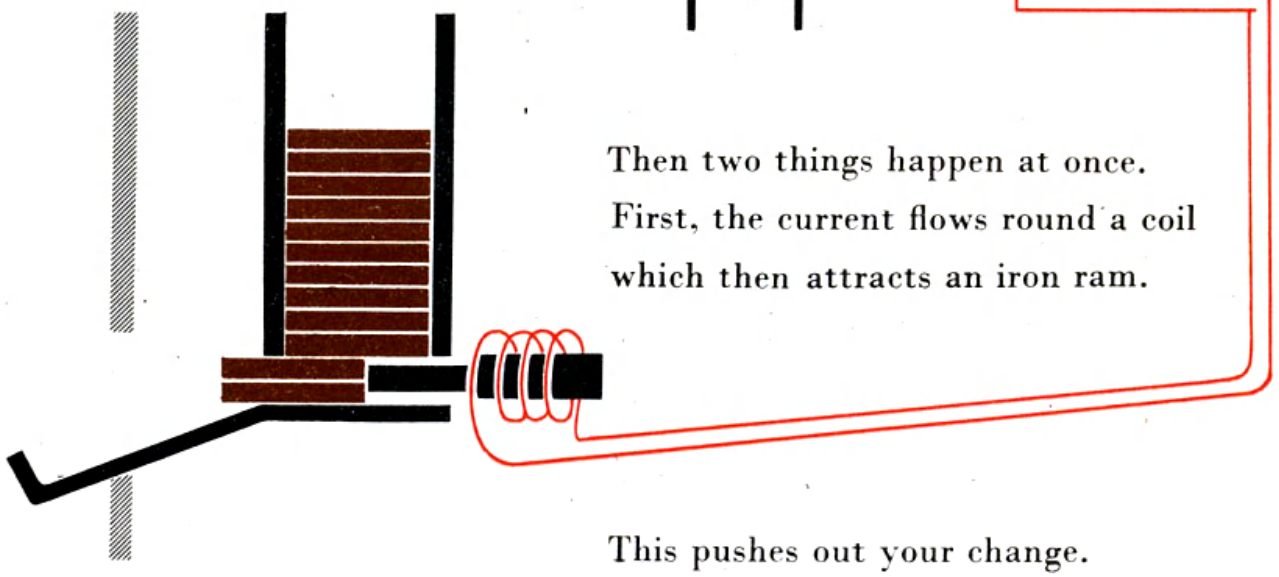
Under the hub of London, Piccadilly Circus, two tube railways cross (at an angle, as and change, and eleven moving staircases carry them quickly to and from the plat-

the map shows). To speed the crowding passengers, machines give them both tickets forms below. Red shows people entering the station, and blue shows those leaving it.

The Machine that Prints Your Ticket and Gives You Change

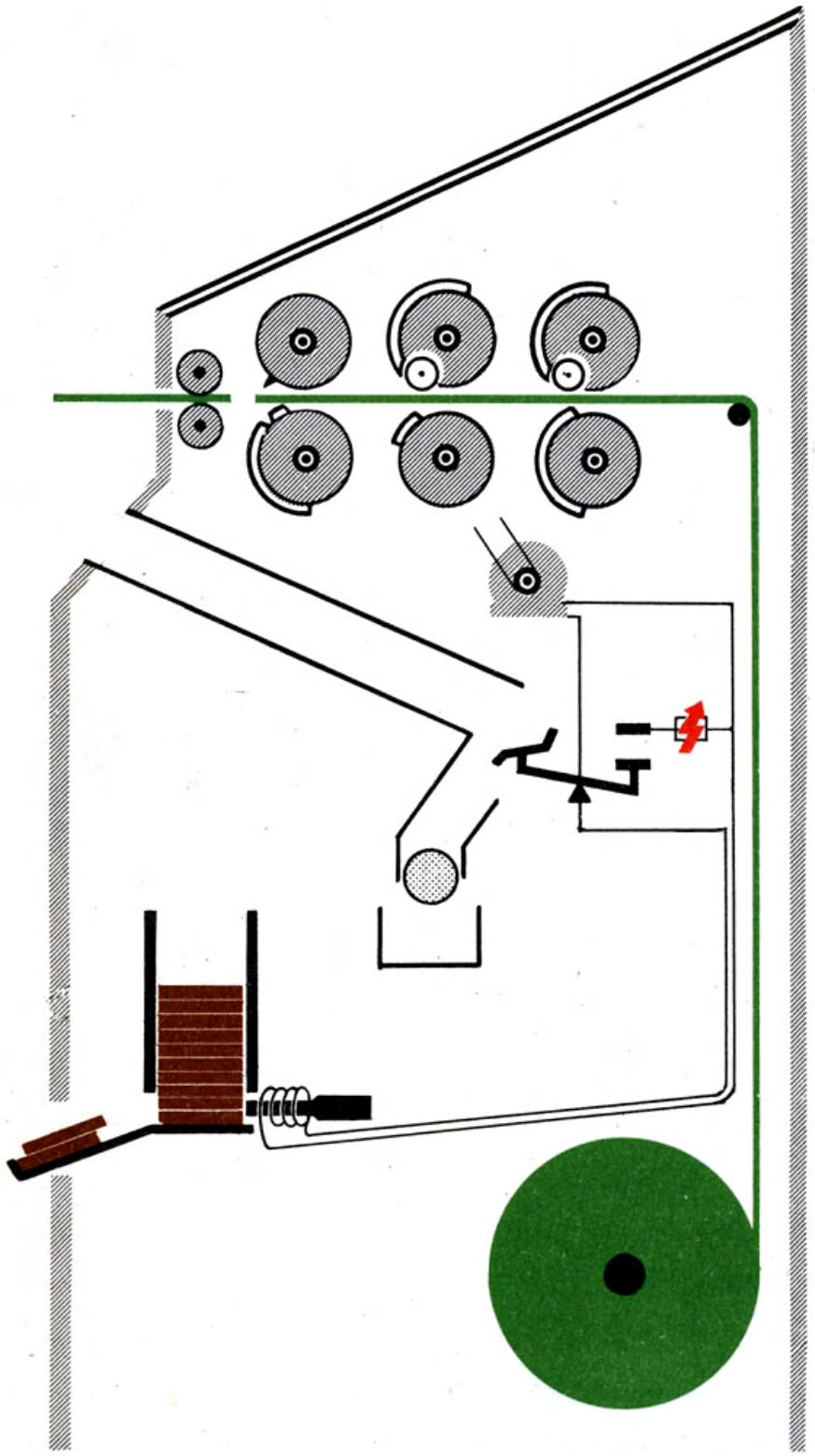


Put sixpence in the slot.
It rolls down a chute and drops on a lever.
Its weight switches on the current.

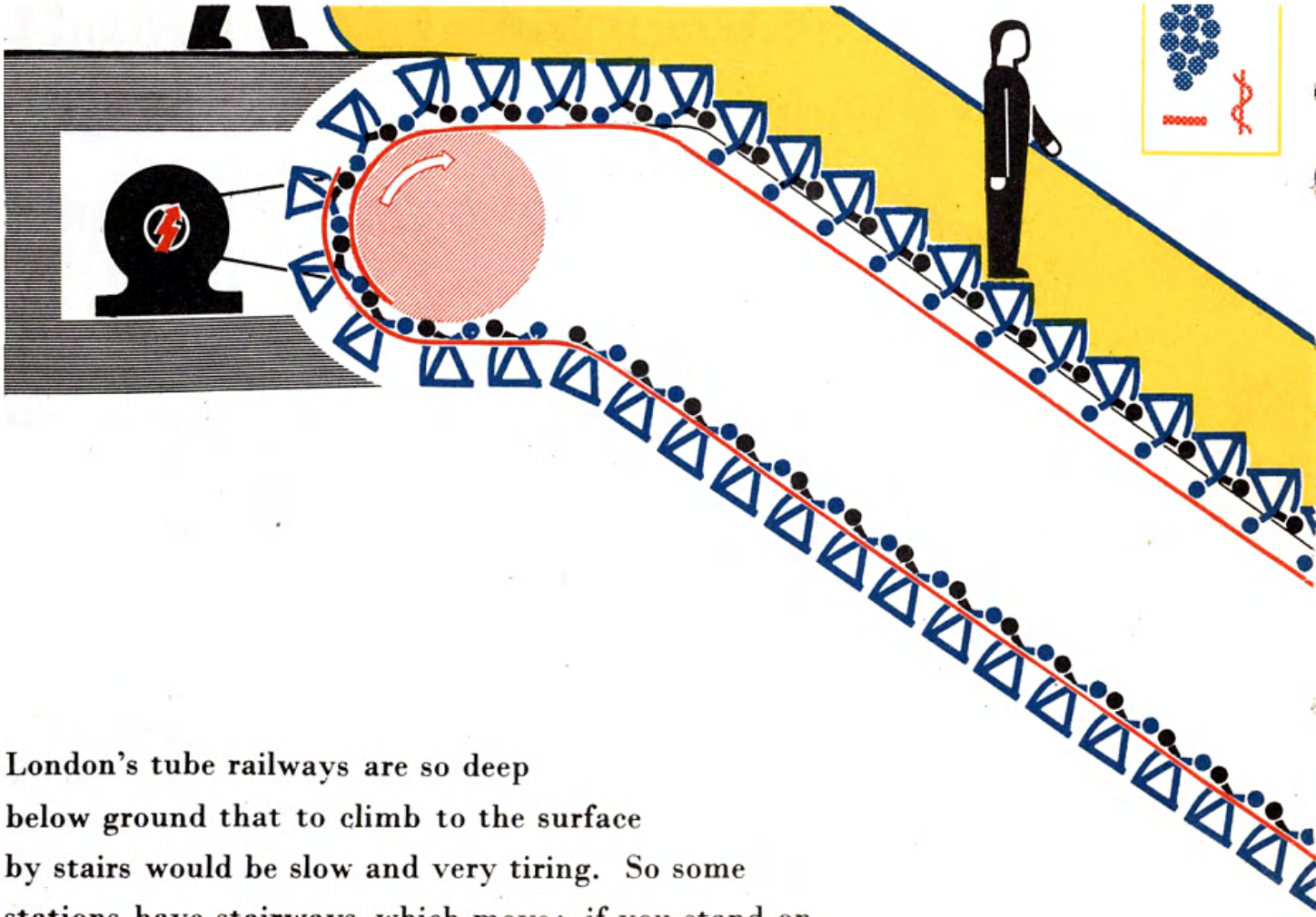


Then two things happen at once.
First, the current flows round a coil
which then attracts an iron ram.

This pushes out your change.

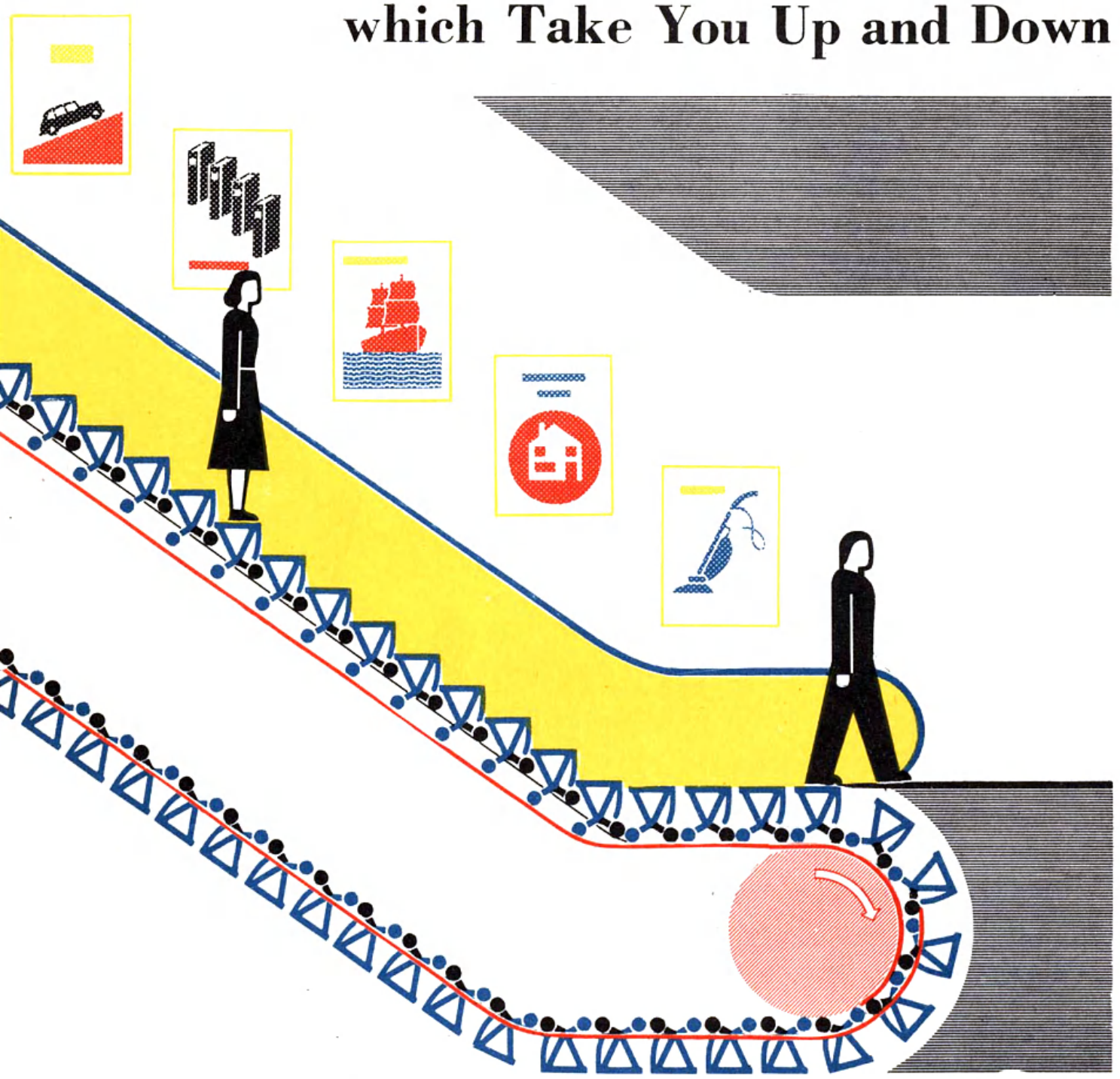


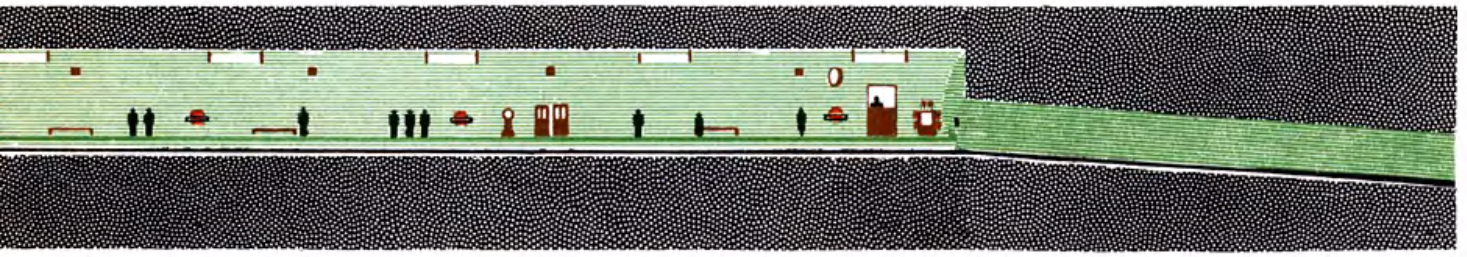
Second, the current starts an electric motor, which sets the printing press in motion. The first pair of rollers prints the names of the stations and the number on the ticket; the second pair prints the date, the third cuts off the ticket, and the fourth holds it out, ready to be taken. All the tickets are made from one long roll of thick paper. Everything happens in a twinkling, and the more machines there are, the more travellers can get their tickets without waiting.



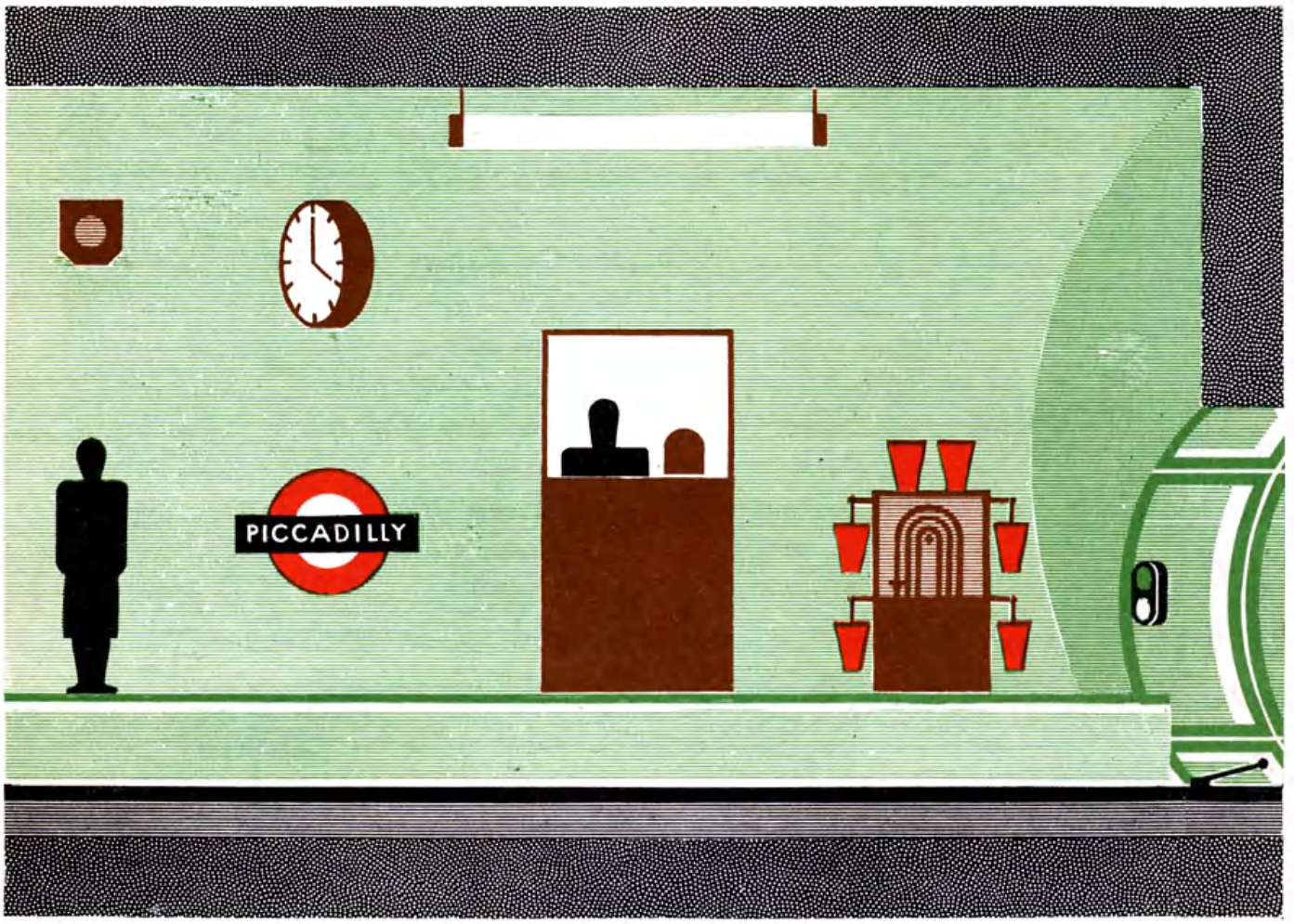
London's tube railways are so deep
below ground that to climb to the surface
by stairs would be slow and very tiring. So some
stations have stairways which move; if you stand on
one, you will be taken down; on another, you will go up.
Each stairway is arranged like a huge belt round two circular
drums, and can turn either way; the top drum is driven by an electric
motor. The wheels of the steps run on rails, or *hang* from rails when upside
down (look how cleverly the change is made at each end). The rails are
arranged so that the treads are always level under your feet; the handrails
move, keeping pace, on separate drums. Often the stairways are built in
groups of three so that two can move in the way most people are travelling.

The Giant Moving Stairways which Take You Up and Down



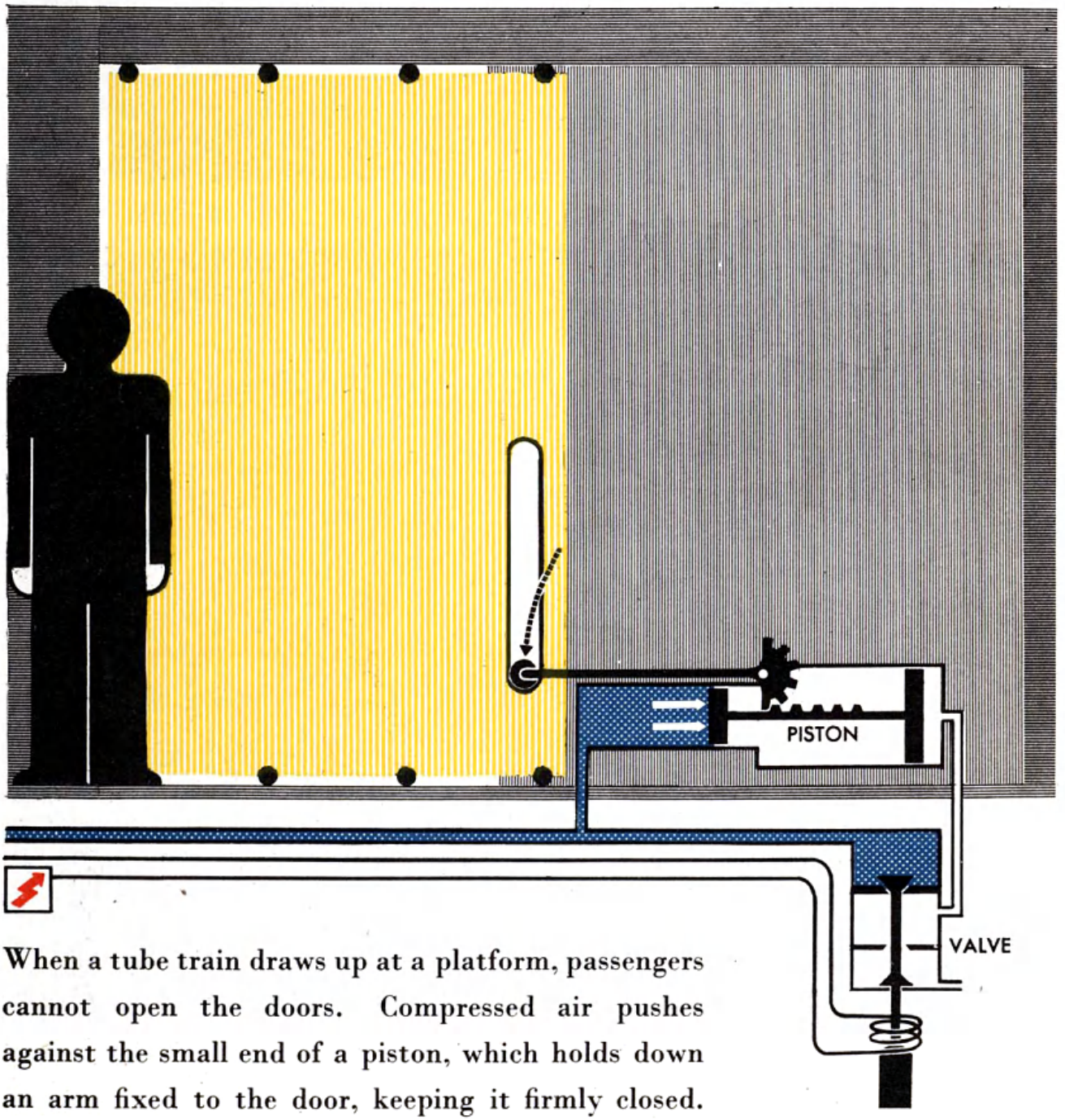


As it leaves the station it runs down a steeper slope, which helps it to gather speed.



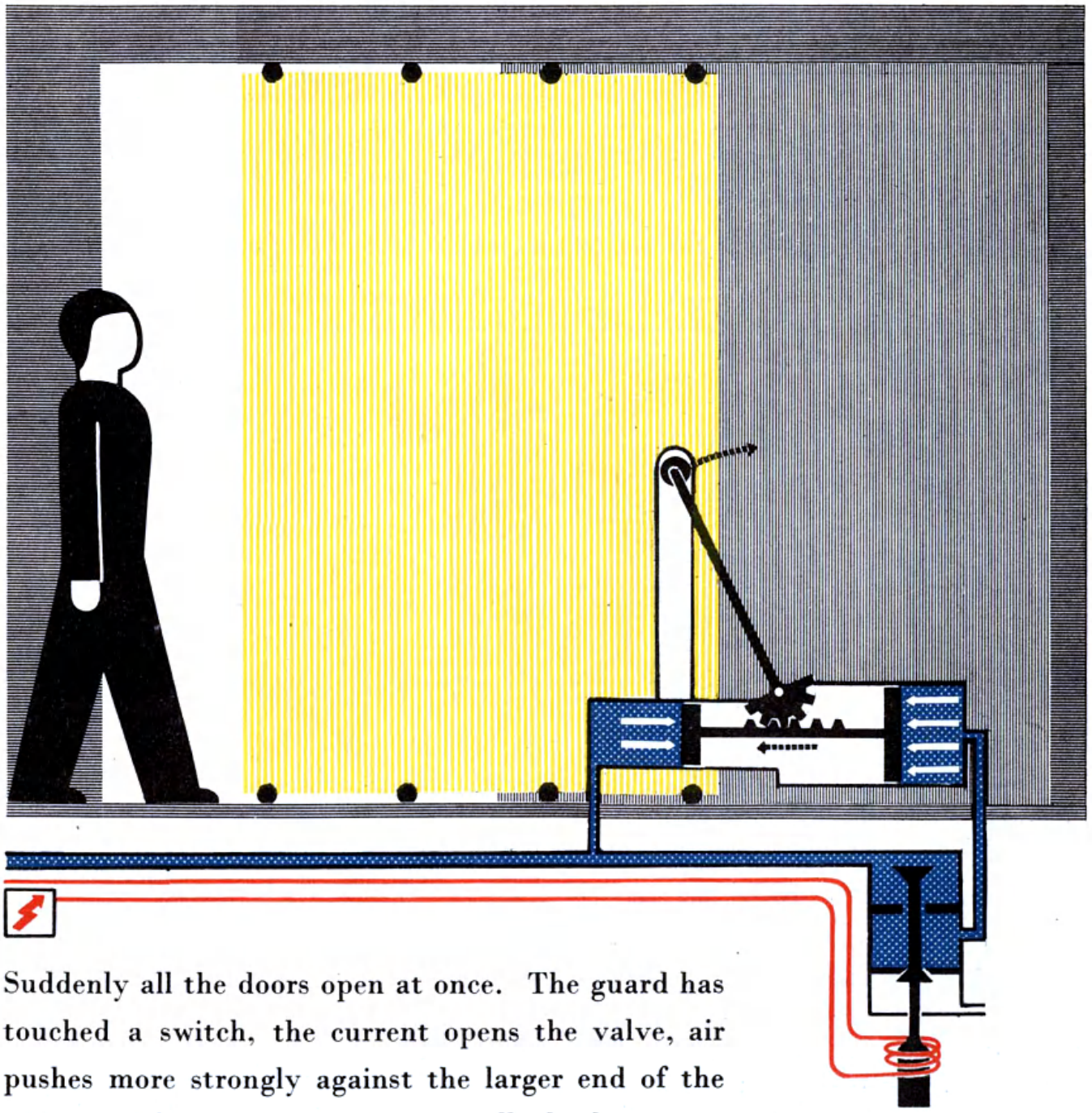
how to change on to other lines. A man standing in a kiosk near the end of the platform makes announcements which are broadcast through several loudspeakers.

How the Doors Open Without Being



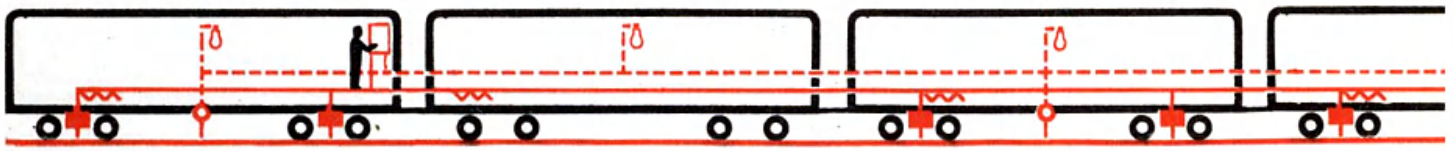
When a tube train draws up at a platform, passengers cannot open the doors. Compressed air pushes against the small end of a piston, which holds down an arm fixed to the door, keeping it firmly closed.

Touched

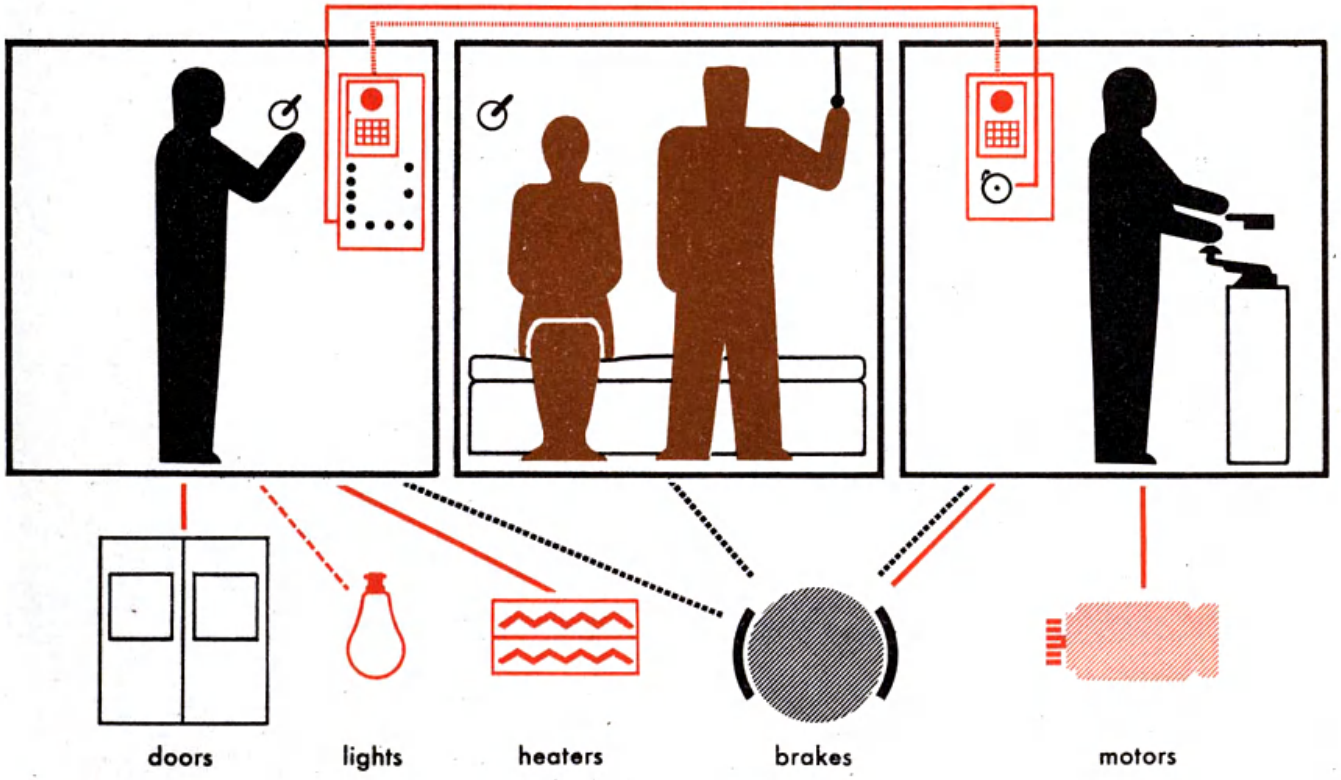


Suddenly all the doors open at once. The guard has touched a switch, the current opens the valve, air pushes more strongly against the larger end of the piston and forces it back. The arm pulls the door open.

The Power which Drives and Lights the

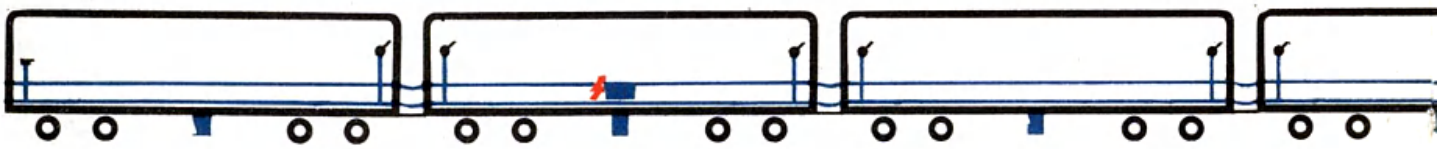


Every car has heaters and lights; some have motors underneath which drive the trains. The current for the motors and heaters comes from the live rails; the same power also drives the generators which make the current for the lights.

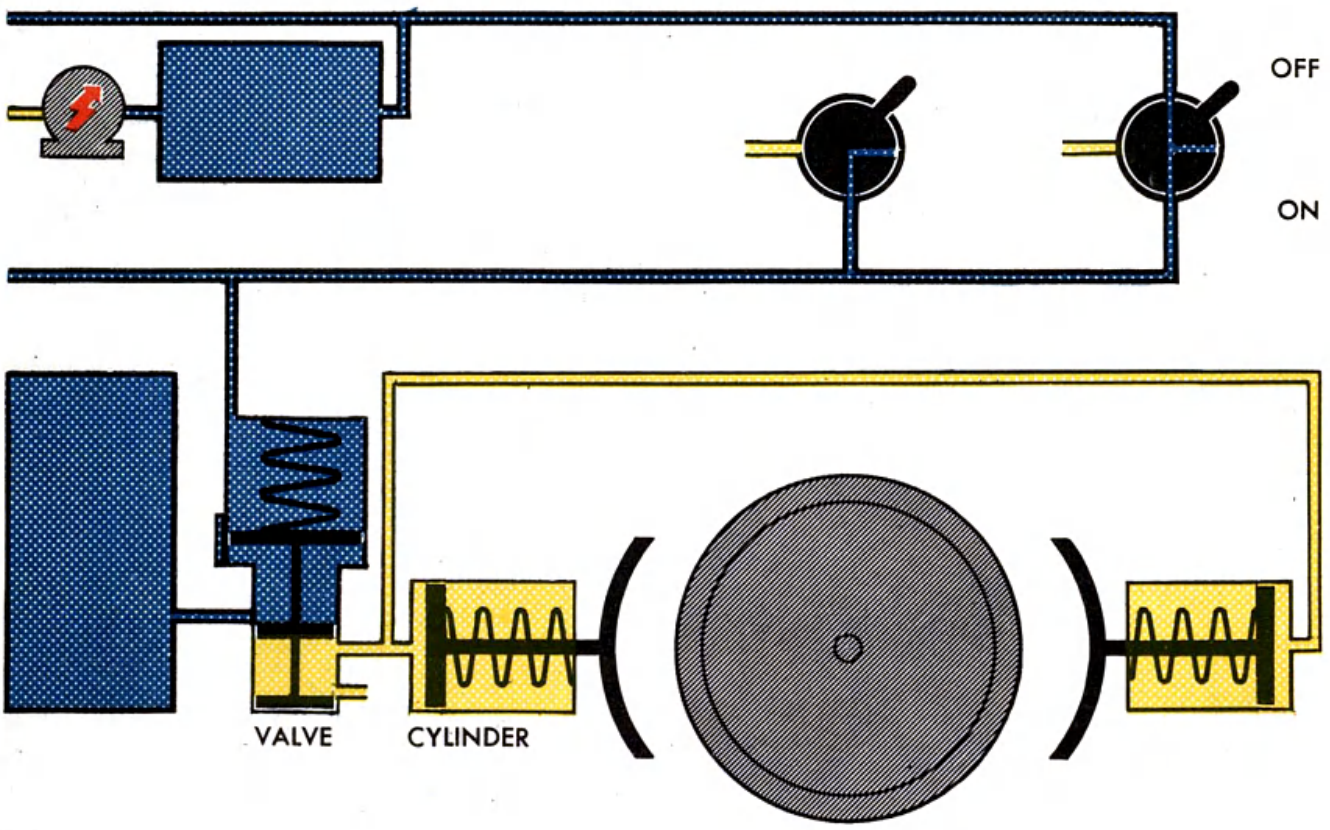


The guard controls switches which work the doors, the lights and the heaters. When the train is ready to start he signals to the driver with an electric bell. The driver controls the driving motors and the switch for the brakes. In emergency, passengers can pull handles which put on the brakes by compressed air.

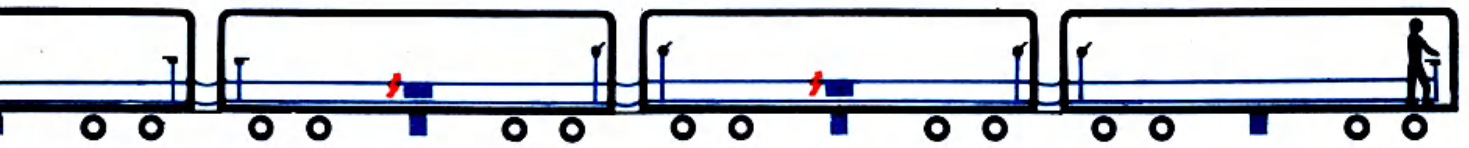
How Air Puts on the Brakes



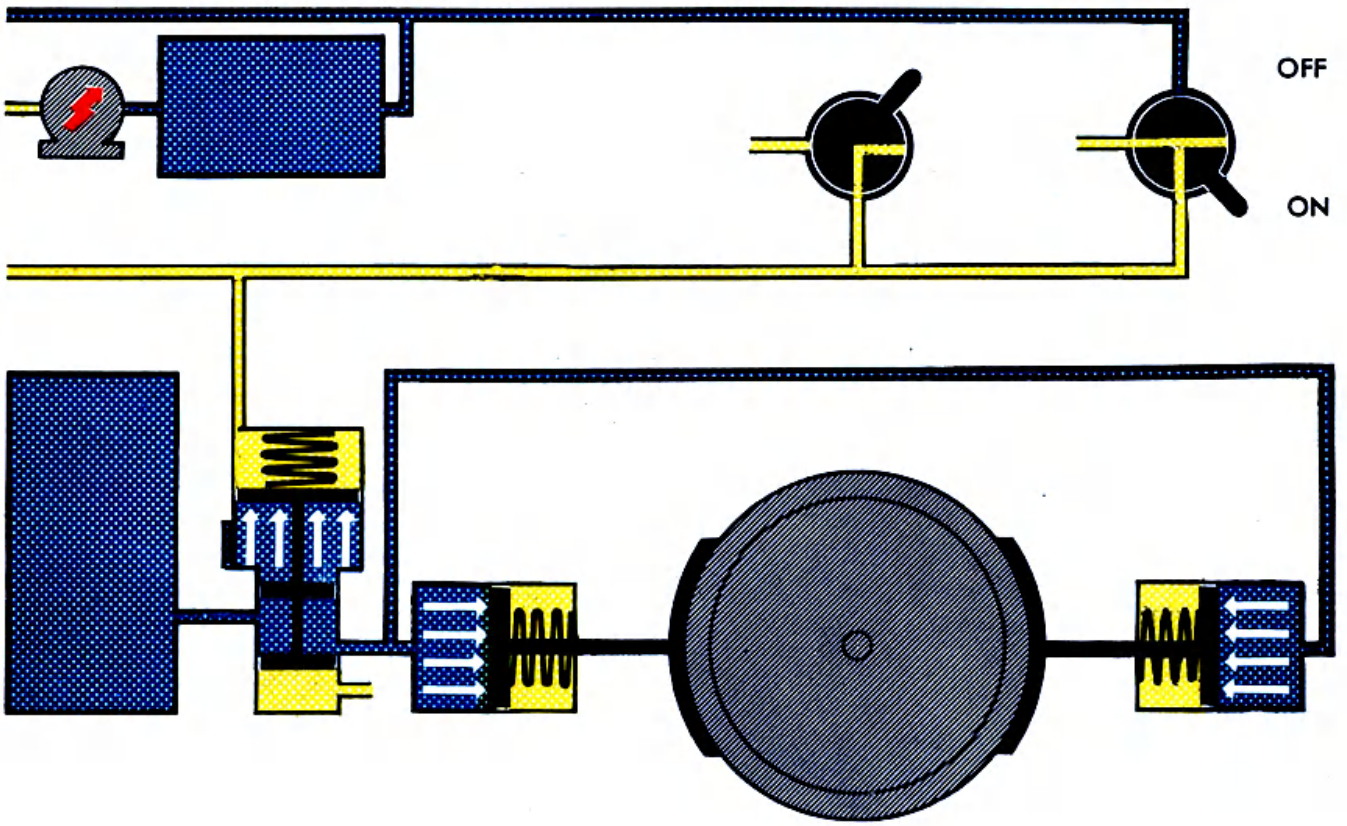
Air is compressed by electric pumps and held in tanks, one tank underneath each car.



The brakes are off. While pressure is high in the tanks and pipes, the upright valve is held down and the air cannot enter the brake-cylinders. The brakes are held off by springs. In an emergency, the driver, the guard, or a passenger can pull a handle which turns tap-pipes and lets air out of the centre pipe.

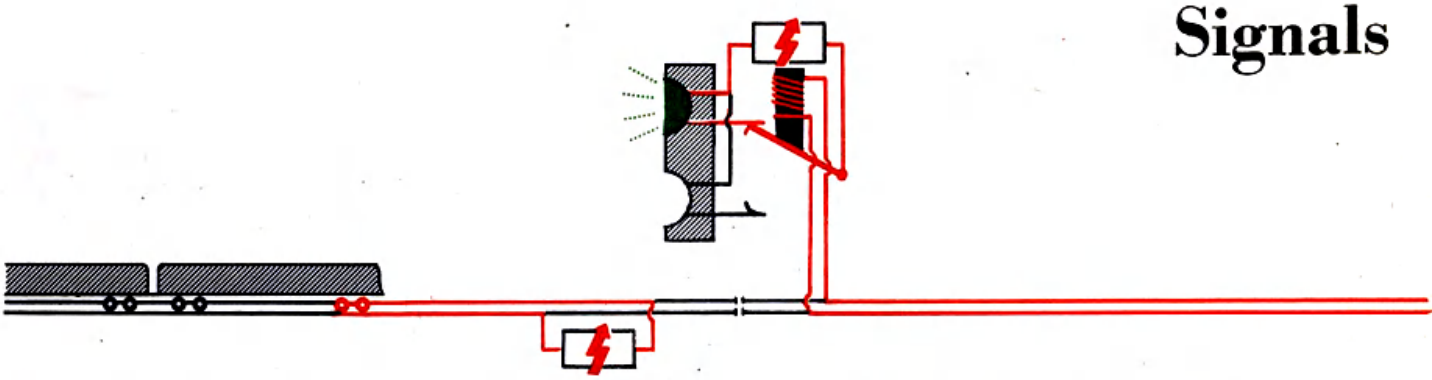


Connected to the tanks are the brake-pipes, which run the whole length of the train.

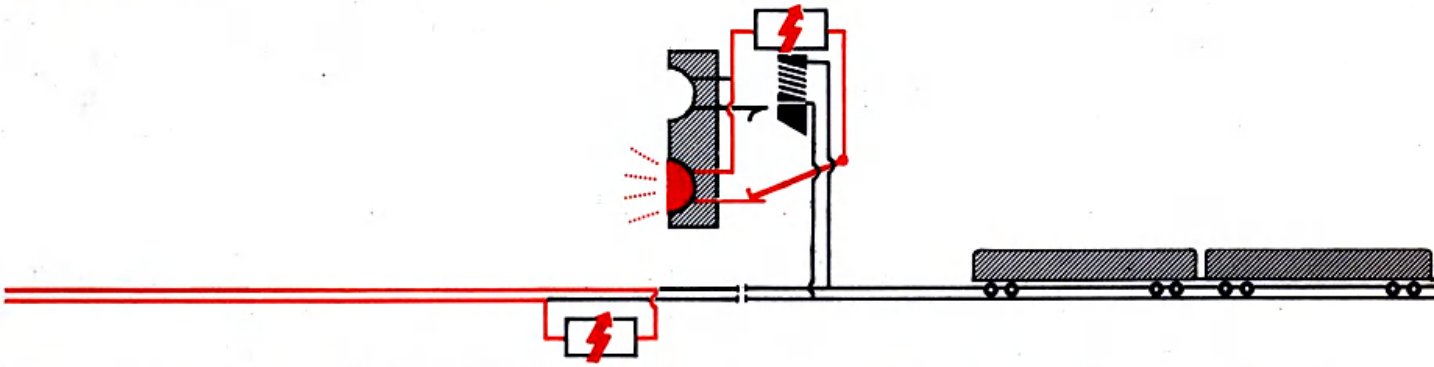


The brakes are on. Why ? Someone has pulled the handle, and pressure is lowered in the centre pipe. The compressed air in the tank has forced up the valve, rushed into the cylinders and pushed on the brakes. If the handle is put up again, the brakes will at once spring back. Can you see how this works ?

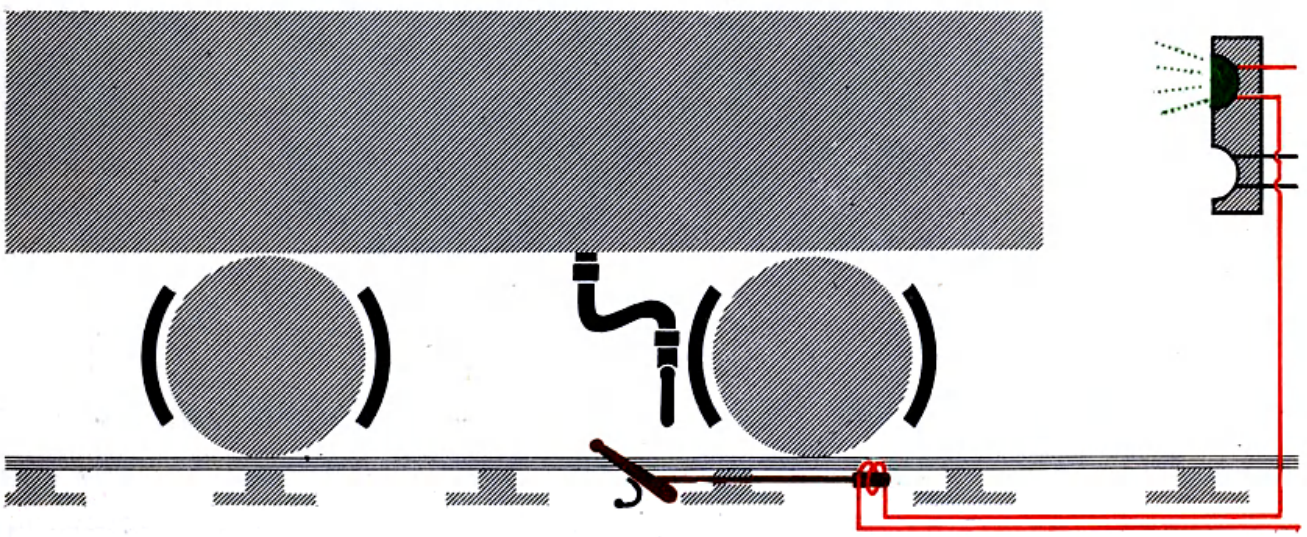
Signals



Trains in the tubes cannot collide. When a stretch of track is clear, a weak current

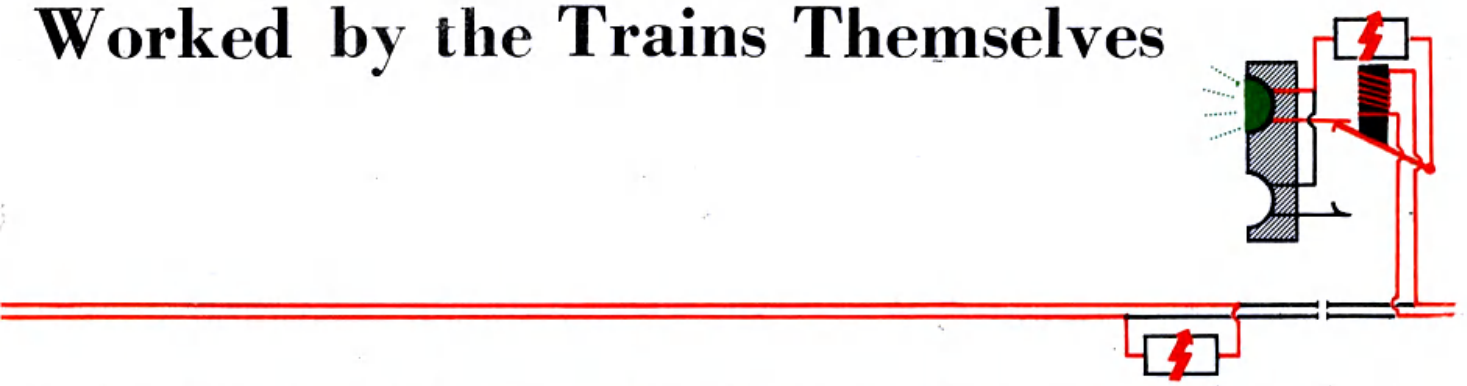


When a train enters the track, the current runs across its front wheels and no longer

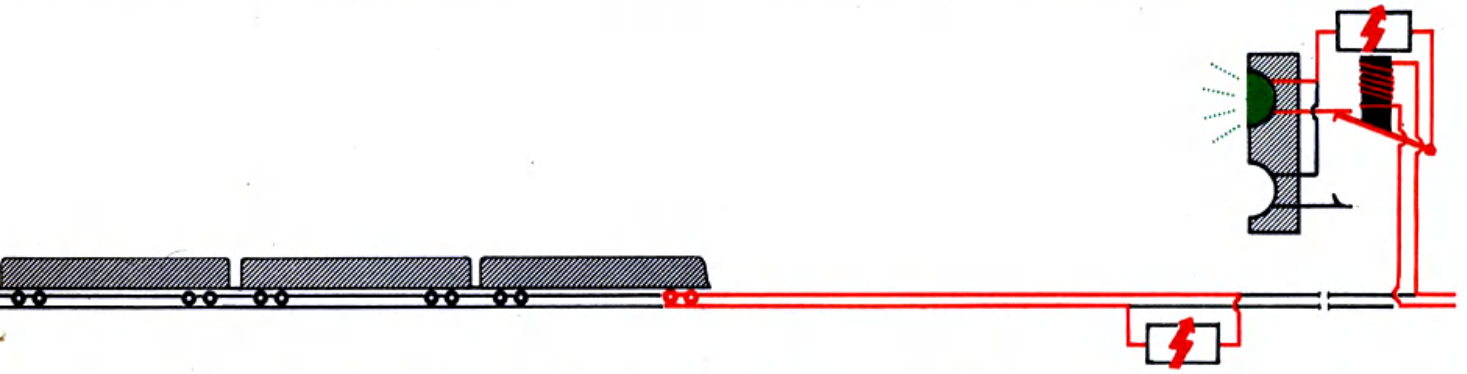


While the green lamp shows, a trip-cock in the track is held down by a current.

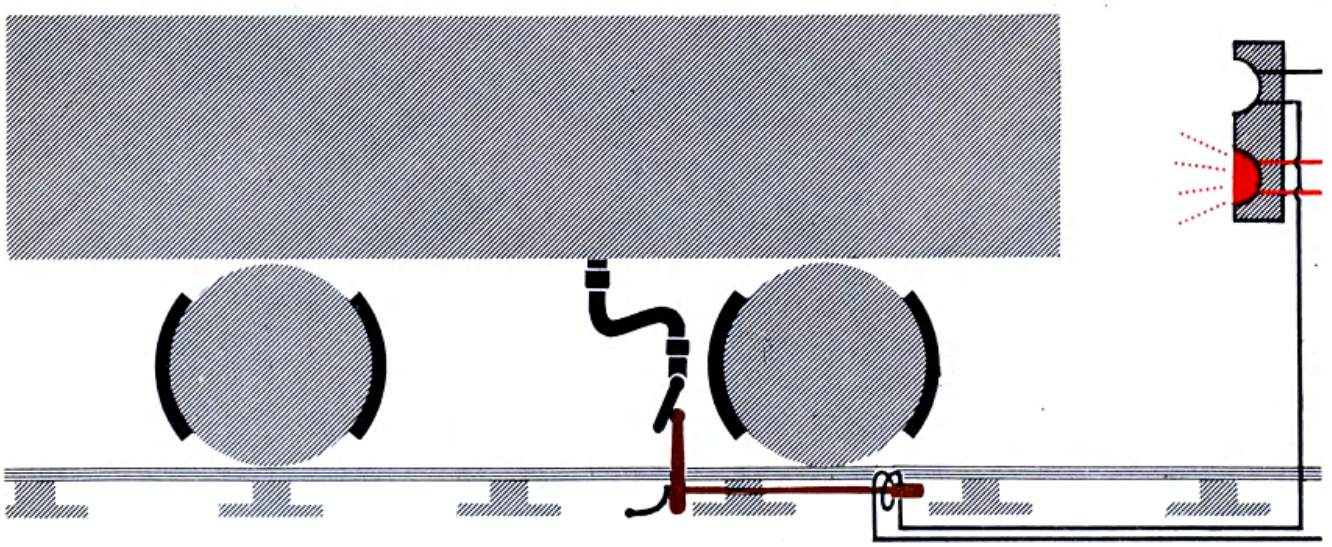
Worked by the Trains Themselves



flowing along the rails keeps up the switch that lights the green lamp—all clear.

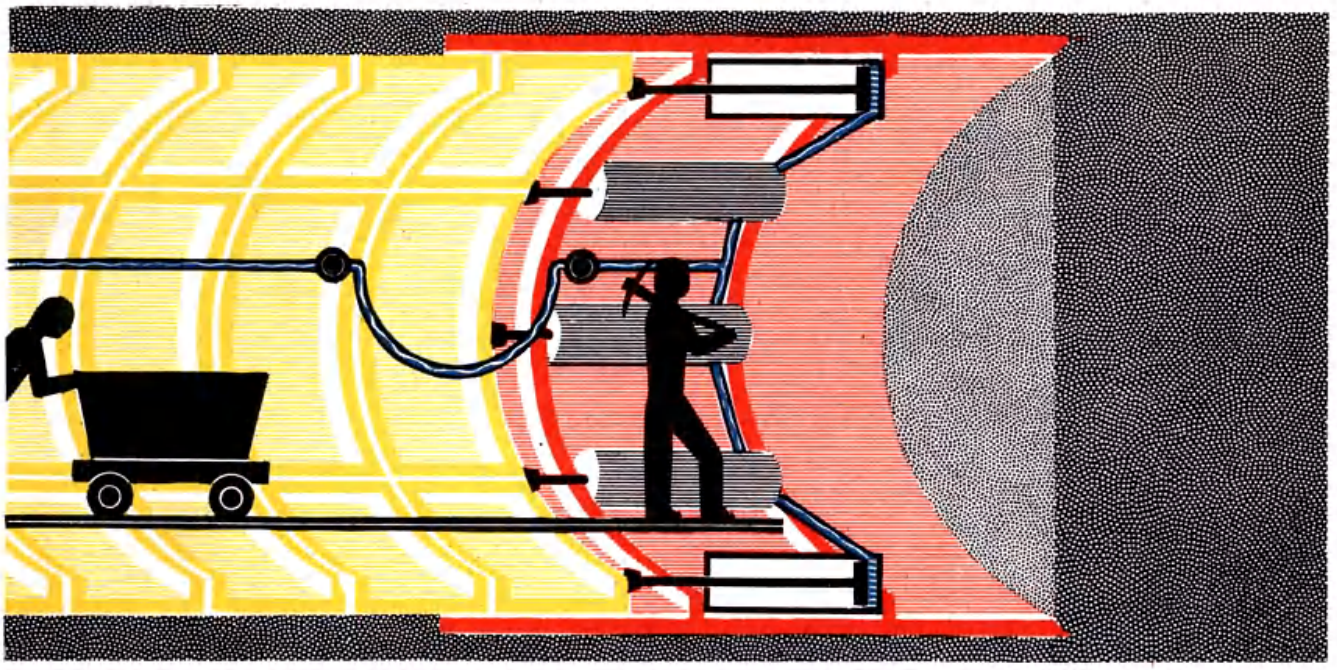


reaches the coil. The switch falls and lights the red lamp to warn the next train.

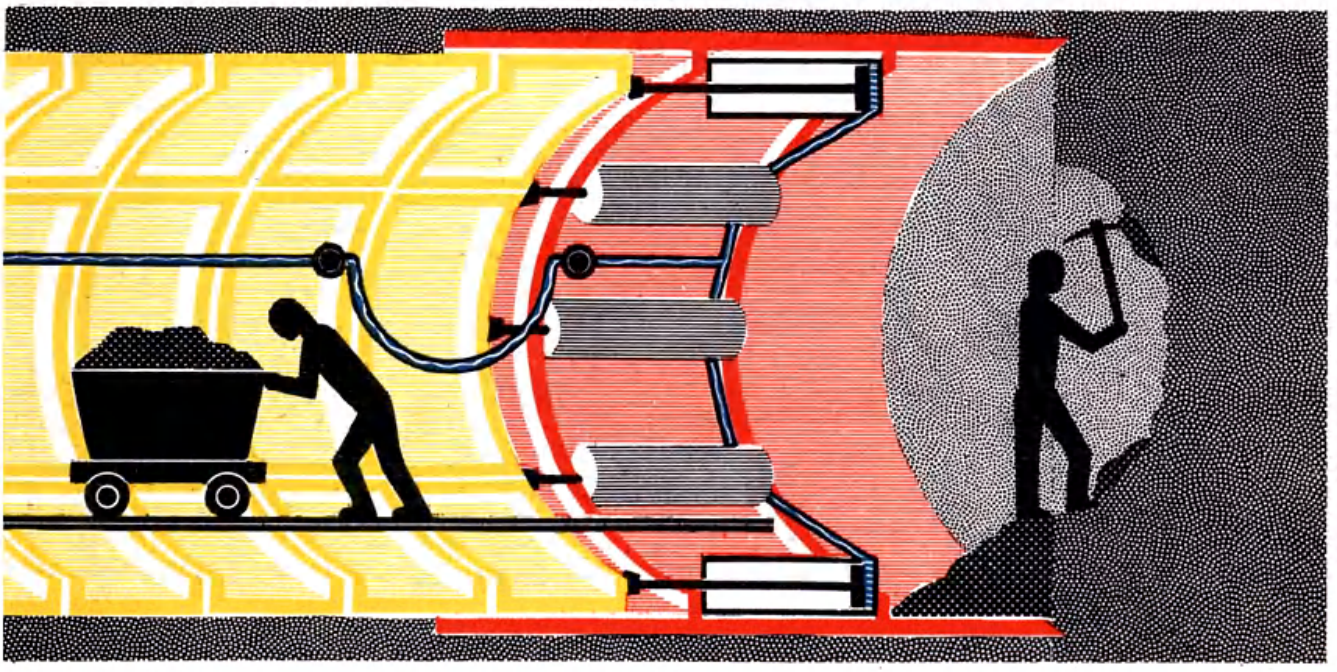


When red shows, it springs up ready to strike a lever which puts on the brakes.

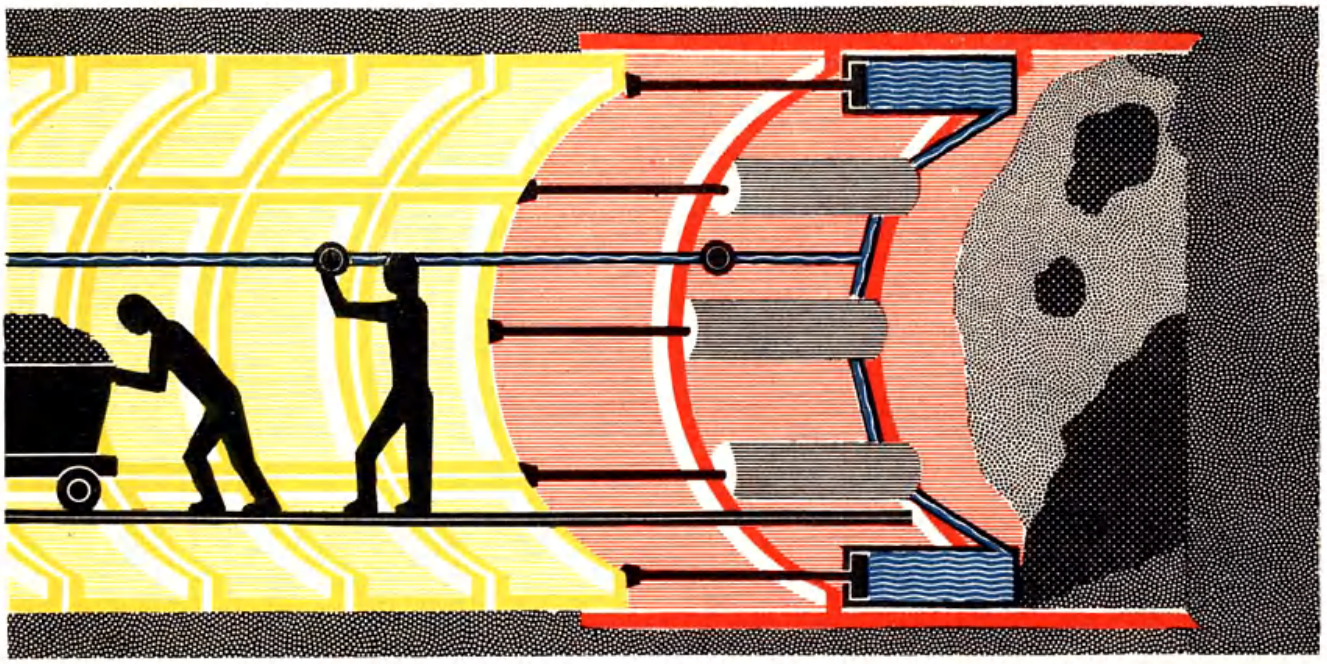
Cutting the Tunnels to Take the Trains



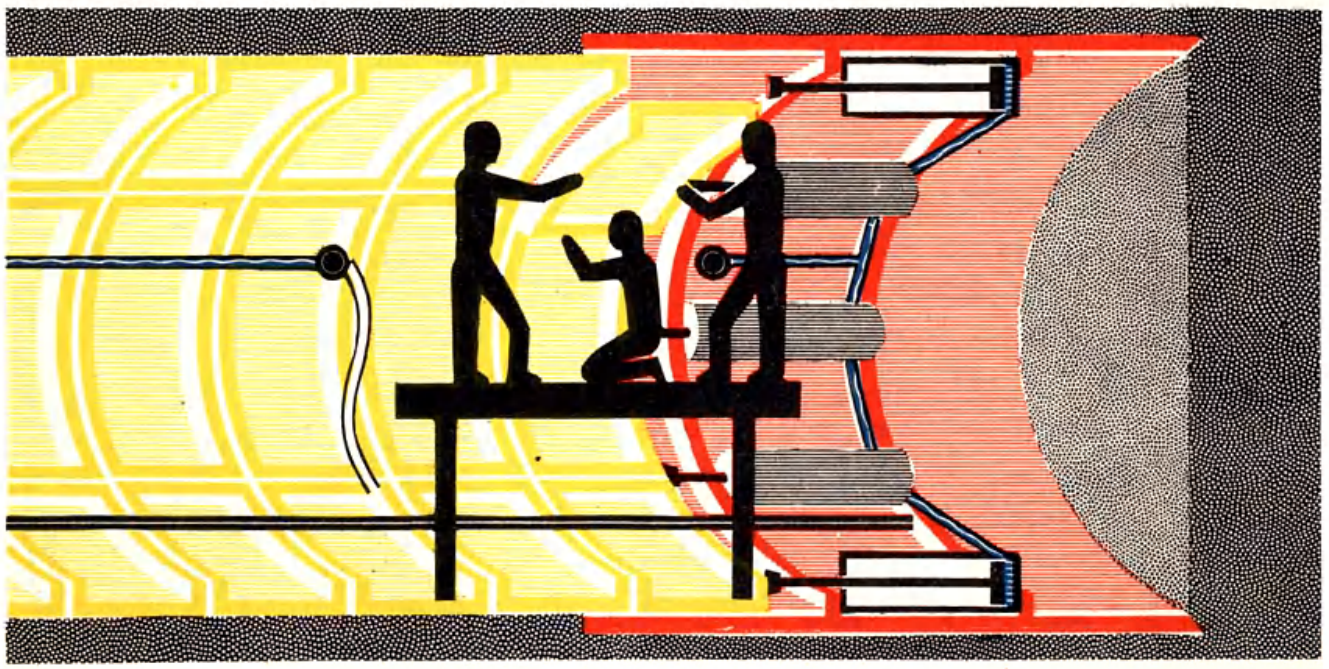
Tunnels are cut by shields like huge apple corers. Inside is a man with a pick.



Ahead of the cutting edge of the shield, he cuts a large hole into the earth.

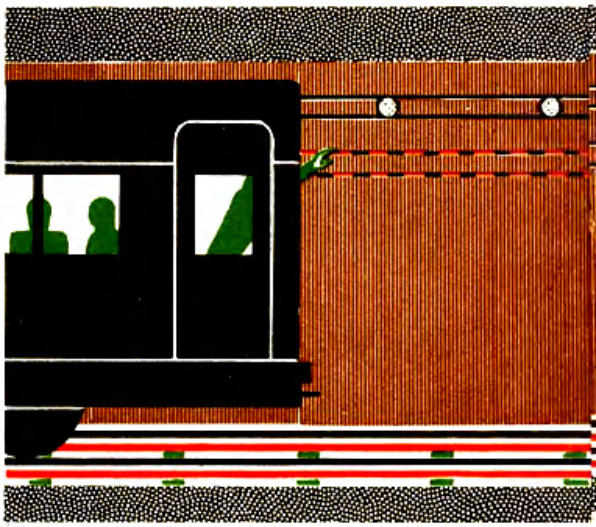


Water-powered pistons drive the shield forward. Earth falls and is removed.



Strips of lining are put in place to support the newly cut length of tunnel.

Walking Out of a Tunnel in Safety



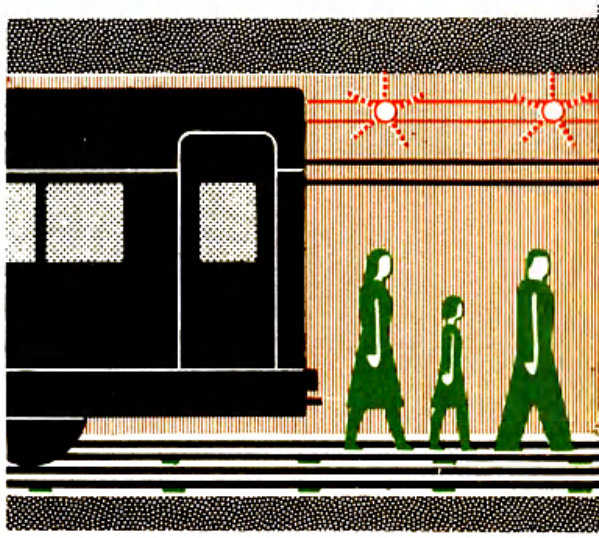
The train has stopped in a tunnel and cannot be started again; the passengers must walk to the next station. How does the driver make safe the dangerous electrified rails? He reaches out of his cabin and touches together two bare wires which run along the tunnel walls.

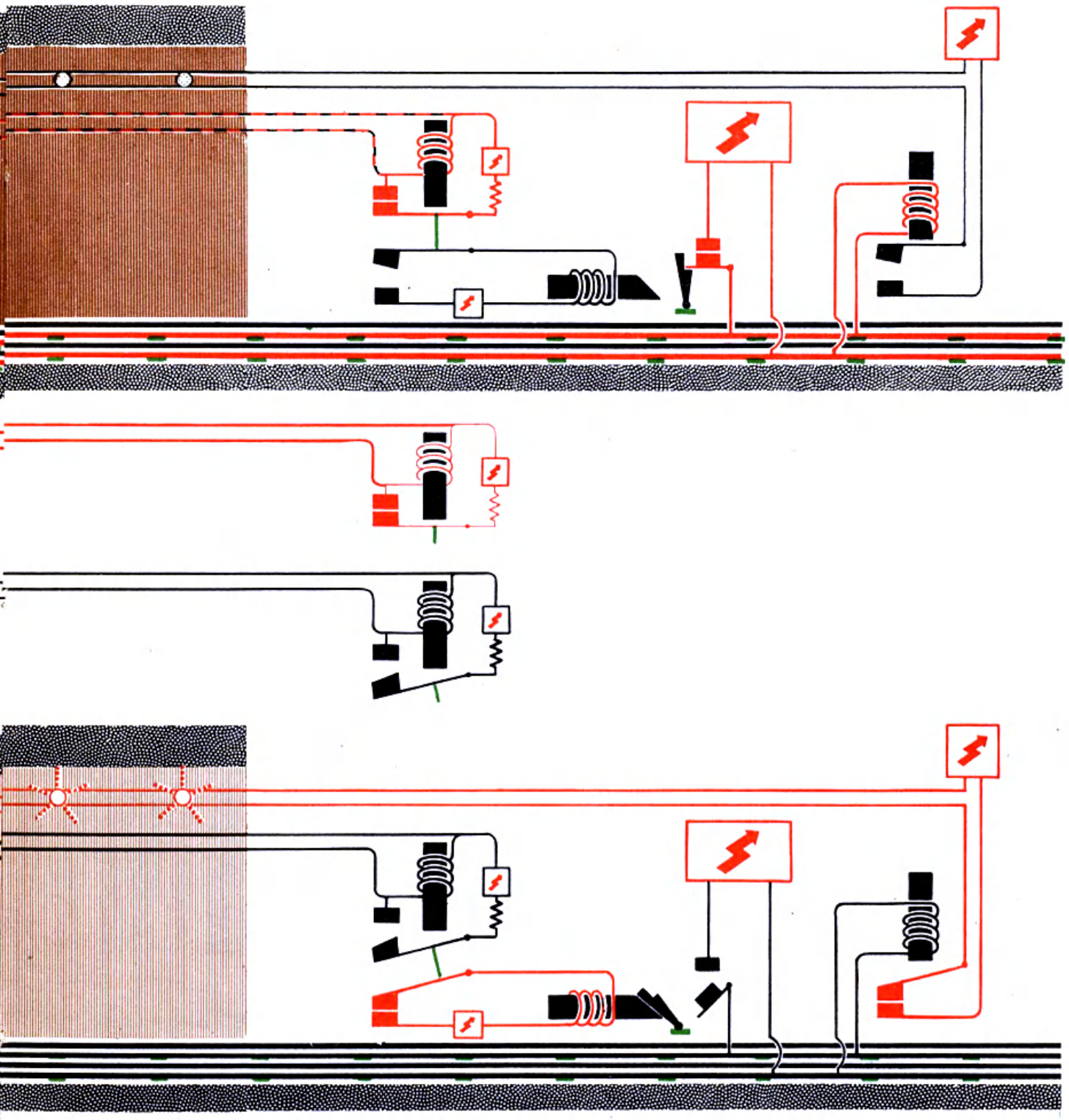
Immediately most of the current which ran through the magnetic coil runs instead along the easier path through the bare wires.

The magnet is weakened and the switch it was holding up falls.

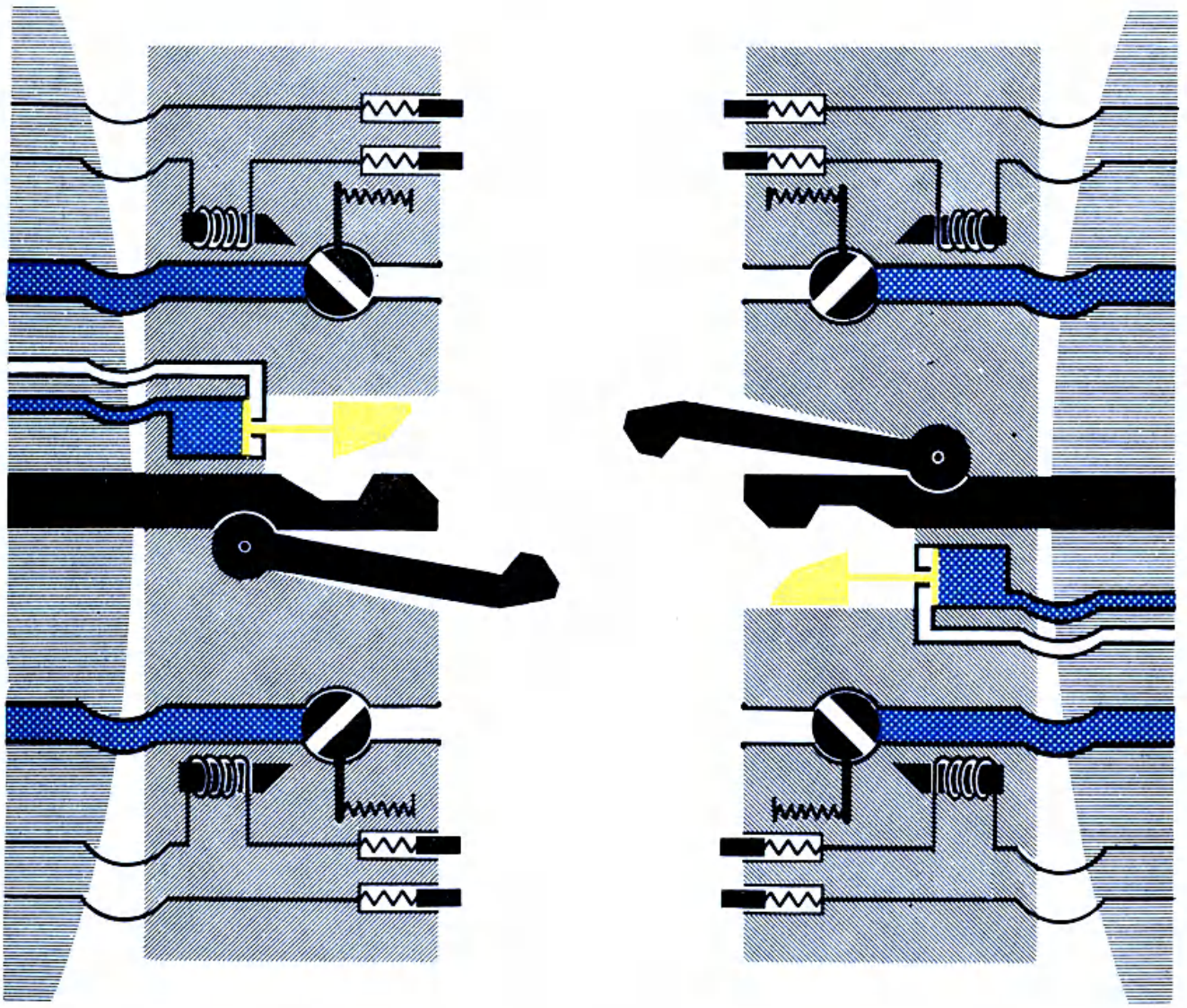
Now begins a fascinating chain of events, for attached to the switch is a second one, which also falls and starts a current through the second magnetic coil. This pulls away a lever and a third switch falls, cutting off the strong current through the live rails.

No current now flows through the third coil and its magnet lets fall the fourth switch. This starts the current which lights up the lamps in the tunnel. So the rails are safe and the tunnel is lighted; passengers can walk to the station in safety.

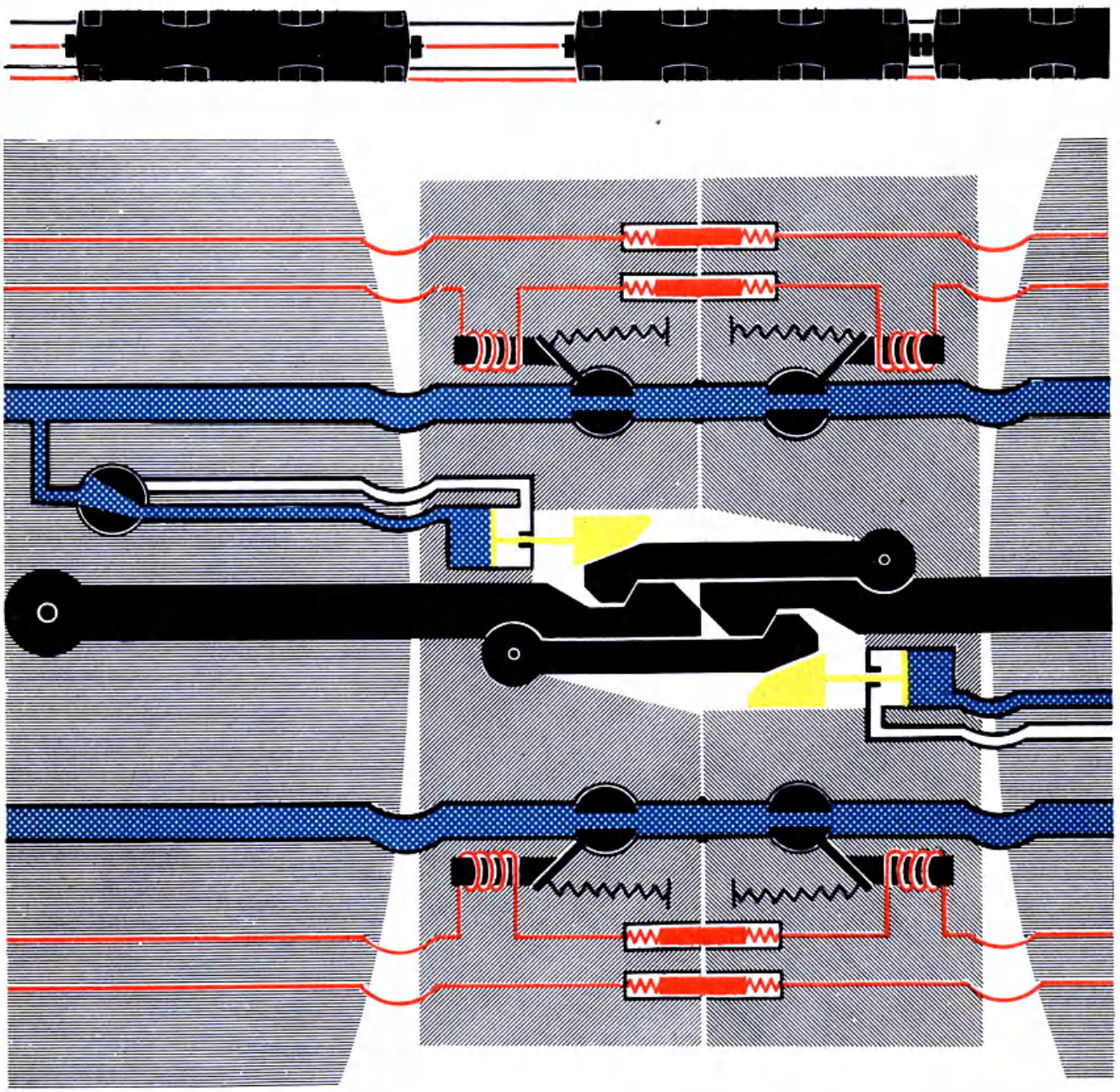




Cars which Lock Themselves Together

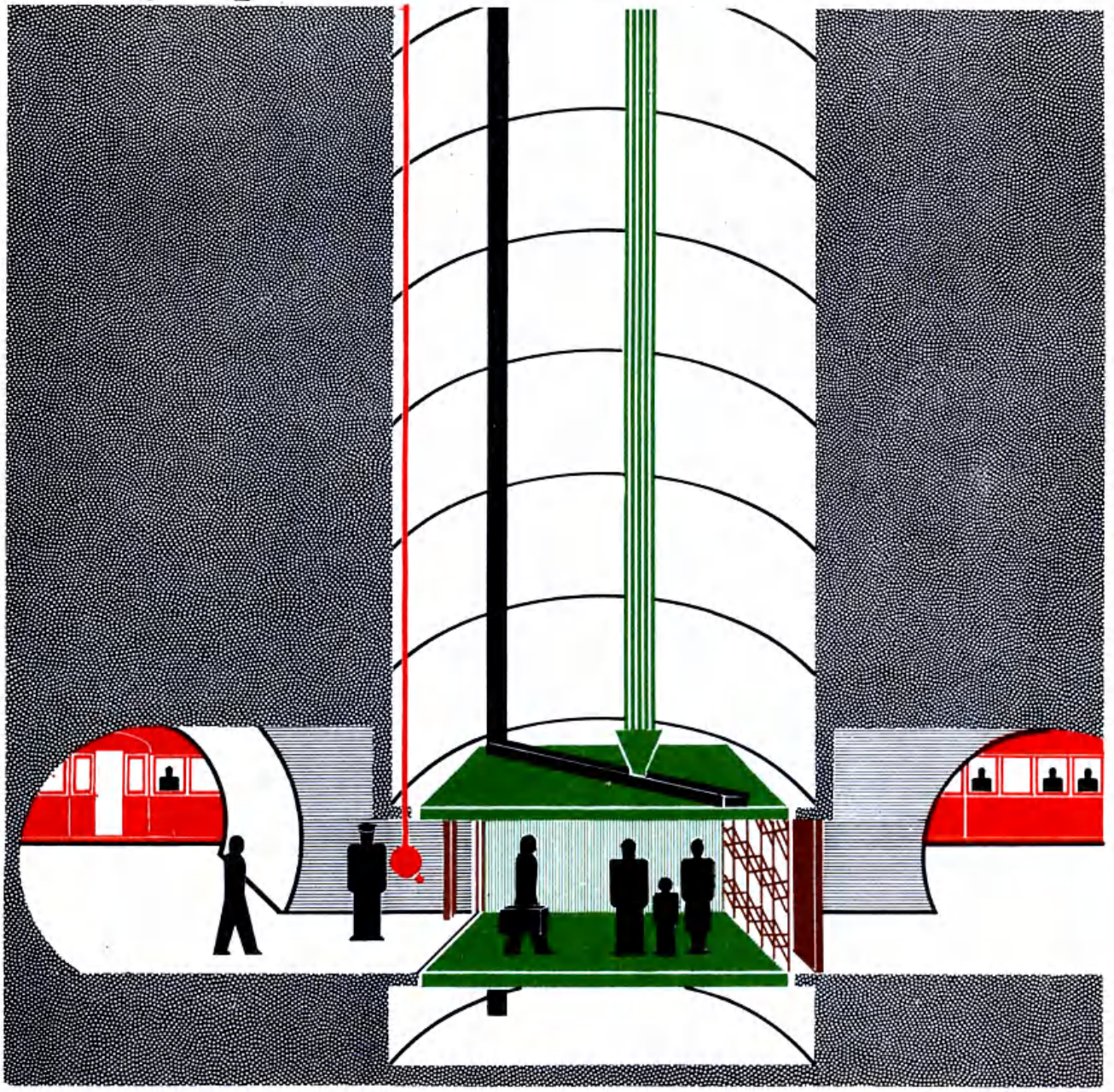


Here we look down from the top on two cars which are being pushed together. The hooked tongues press against wedges (shown in yellow) which force them into slots, where the wedges (pushed by the compressed air) fix them firmly.

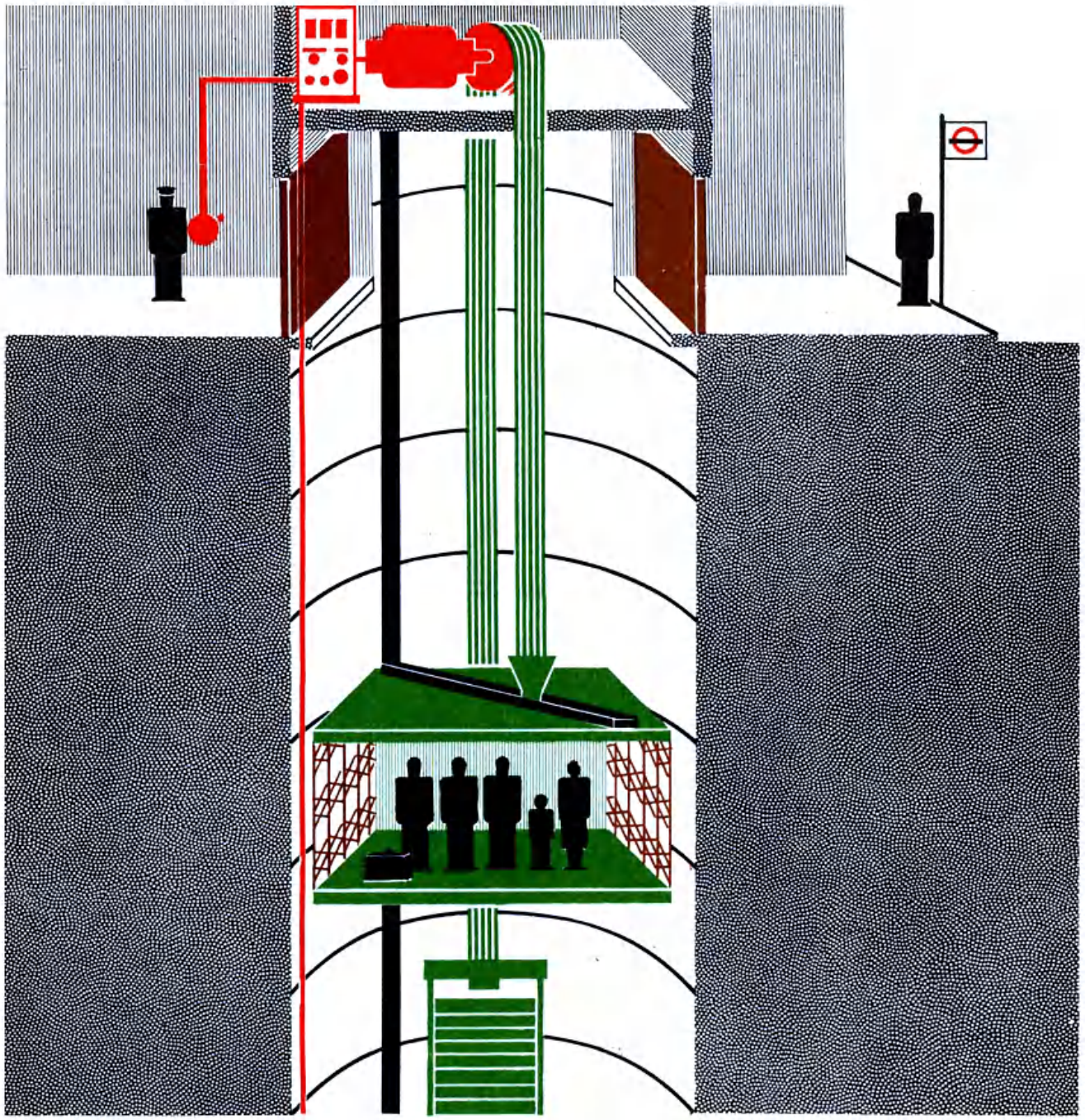


Once the cars are joined, the current flows through the spring contacts. One current opens the taps in the pipes of compressed air. To separate these cars, we must push the wedges back again. Can you think how this could be done ?

Going Up in a Giant Lift



At many stations, great lifts carry passengers up and down. Some of them are raised by strong wire ropes driven by electric motors. Heavy weights on



the ropes help to bring the lifts up; steel guides inside the shafts keep them steady. A man starts the lift; the doors open automatically at the landings.

A Station Beneath a Station

Three stations in one — main-line, high-level underground, low-level tube.

designed by ISOTYPE